Annotated Bibliography of Wetlands and Buffer Zone Resources

Boyd, L. (2001), Buffer zones and beyond – wildlife use of wetland buffer zones and their protection under the Massachusetts wetland protection act

The author provides a comprehensive review of the habitat needs of 65 animal species dependent on wetlands for their habitat needs in the state of Massachusetts. [Animal species present in Massachusetts are comparable to those in New Hampshire.] 77% of the 65 species make use of areas from the wetlands edge to 100' beyond it, 58.5% use from the edge to 200' beyond, and 52% use from the edge to beyond 200'.

This paper provides interesting science-based data on wetland habitat needs of animal species present in MA (and NH) to include: turtles use areas beyond 200' from the wetland edge (nesting distances average 656' from the wetland); amphibians such as spring peepers and spotted salamanders over-winter at distances up to 900' and 2700' respectively; mammals such as mink use upland areas for foraging with males ranging on average 2-3 miles and beaver primarily feed within 328' of open water; 23 bird species are wetland dependent and require upland areas for nesting and foraging. See the numerous charts in this document for information on hundreds of animal species.

Castelle, A. J., Conolly, C., Emers, M., Metz, E.D., Meyer, S., Witter, M., Mauermann, S., Erickson, T., Cooke, S.S.. (1992). Wetlands buffers: use and effectiveness. Adolfson Associoates, Inc., Shorelands and Coastal Zone Management Program, Washington Department of Ecology, Olympia, Pub. No. 92-10.

The authors reviewed the scientific literature on wetland buffers and their capacity to minimize negative impacts on wetlands functions from adjacent development. The literature indicates that buffers protect water quality by moderating soil erosion and removing pollutants from runoff; lessen fluctuation in water levels which could destroy wetland vegetation; provide essential habitat for a variety of mammals, birds, amphibians and reptiles; and minimize the impacts of human disturbance. The effectiveness of buffers increases with their width.

This paper provides a good overall summary of buffer utility and functions. A good first study to read to learn about wetland buffers.

Cygan, D. (2014). New Hampshire Guide to Upland Invasive Species, New Hampshire Department of Agriculture Markets and Food, Plant Industry Division, 4th edition.

This is a useful guide which includes written and photographic descriptions of invasive species, their habitats and suggested methods for management and control of their spread. Species listed here may be found in upland areas adjacent to wetlands.

Cygan, D. (2018). Preventing the Spread of Japanese Knotweed Reynoutria japonica (AKA: Fallopia japonica, Polygonum cuspidatum) Best Management Practices, New Hampshire Department of Agriculture, Markets and Food.

This document provides current information on how best to control Japanese knotweed, an increasingly common and problematic invasive species in New Hampshire.

Flanagan, S. E., Patrick, D. A., Leonard, D. J., and Stacey, P. (2017). Buffer options for the bay: exploring the trends, the science, and the options of buffer management in the great bay watershed – key findings from available literature.

This literature review was commissioned by the Buffer Options for the Bay (BOB). The authors synthesize available science relevant to buffer management of the Great Bay Estuary and its tributaries in southeast New Hampshire. The goal was to assist "stakeholders to make informed decision that make best use of buffers to protect water quality, guard against storm surge and sea level rise, and sustain fish and wildlife in the Great Bay region."

The authors structure their paper through answers to questions: what environmental issue should be addressed through buffer use? and how would buffers effectively address those issues?

While the focus is specific to the Great Bay Estuary system, the information is relevant to other wetland systems. There is a good discussion on the importance of considering the differences between buffer effectiveness and functions gleaned from experimental study samples and those taken from "real world" study samples. Overall, a very clear and useful report.

Garcia, D. et al. (2014). New Hampshire wetlands buffer policy – a political feasibility study of a centralized wetlands buffer policy.

The authors assess how amenable the political landscape in New Hampshire was (as of 2014) to setting state wide wetland buffer zones. Without making specific recommendations the authors offer two options to the state should it choose to set a buffer zone requirement and some suggestions for policy options.

This paper provides useful information specific to wetland buffers which includes: factors that enhance buffer performance; buffers need to be maintained (a potential cost consideration for localities); significant sediment purity (a good metric for wetland health) can be achieved with a 50' buffer and a buffer of 100' or more does <u>not</u> provide any significant increase in wetlands protection.

McElfish, J. M., Lihslinger, R. L., Nichols, S. S. (2008). Planner's guide to wetland buffers for local governments. Environmental Law Institute, Washington DC.

This paper is meant as a guide to localities interested in enacting wetlands ordinances. It is based on a review of enacted wetlands ordinances, model ordinances and hundreds of scientific studies of buffer effectiveness. The point is made from the outset that wetland buffers are essential to preserving wetland functions. The authors summarize the effectiveness of varying buffer widths at removing a variety of pollutants and at protecting habitats of various animal species. Five options for setting buffer distances are discussed. Four of the five options specifically address the importance of an undisturbed buffer and establishing a setback from the edge of the buffer to accommodate buildings. It was noted that no buffers of 25' or less reduced disturbance to an adjacent wetland. Buffers greater than 50' showed fewer signs of human disturbance.

This paper provides a good overall discussion of how best to approach developing a wetland ordinance for one's town with a useful summary of the scientific literature on how buffers protect wetlands and how to enhance their effectiveness.

Wenger, S. (1999). A review of the scientific literature on riparian buffer width, extent and vegetation.

The author reviewed literature on determining riparian buffer widths and characteristics in an effort to assist Georgia jurisdictions with establishing riparian buffers. Vegetative buffers are effective in trapping sediment, the worst pollutant in streams and rivers. Buffers also can effectively control such pollutants as phosphorus and nitrogen including nitrates.

For our purposes, this paper provides a good summary/analysis of the effectiveness of buffers in countering the adverse effects of such pollutants as sediment, phosphorus, nitrogen and other contaminants (organic matter, biological contaminants, pesticides and metals).

Concluding remarks:

There is general agreement from these papers that buffers and wetlands should be considered as integrated systems – wetlands cannot survive without their upland buffers. There is also agreement that the effectiveness and functions of buffers is determined by the interplay of such factors as slope, hydrology, soil make-up and vegetative cover. There is not agreement on recommended minimum buffer widths. Such recommendations are dependent on buffer characteristics, the environmental issues to be addressed (for example preserving water quality, animal habitat, etc.), and "real world" issues such as existing and proposed construction.